



## Ethical Issues Associated with Artificial Intelligence in Respiratory Disease Management: A Scoping Review.

Saranya J<sup>1</sup>, Anjali Gupta<sup>2</sup>, Darshana T R<sup>3</sup>,

<sup>1</sup>Assistant Professor, Department of Respiratory Therapy, Yenepoya (Deemed to Be University) Bangalore - 560064

<sup>2</sup>Post Graduate - Student, Department of Respiratory Therapy, Yenepoya (Deemed to Be University) Bangalore - 560064

<sup>3</sup>Under Graduate - Student, Department of Respiratory Therapy, Yenepoya (Deemed to Be University) Bangalore - 560064

**Emails:** [saranya.vnb@gmail.com](mailto:saranya.vnb@gmail.com)<sup>1</sup>, [anjaligup.anjali16@gmail.com](mailto:anjaligup.anjali16@gmail.com)<sup>2</sup>, [darshanatr2005@gmail.com](mailto:darshanatr2005@gmail.com)<sup>3</sup>

### Abstract

Artificial intelligence (AI) applications are increasingly integrated into the management of Respiratory conditions, including Asthma, Pneumonia, and Occupational Lung Disease. While clinical benefits are evident, Ethical concerns in domains related to Data Privacy and Confidentiality, Algorithmic bias, and Equity, Transparency and Black box pattern, Accountability, Patient autonomy, and Surveillance remain insufficiently examined. This scoping review aimed to map and synthesize published evidence that described ethical challenges associated with the deployment of AI technologies in the management of respiratory disease. A scoping review was conducted in accordance with Joanna Briggs Institute (JBI) guidelines, with structured searches conducted in Pub-med, Web of Science, and Scopus for peer-reviewed articles published between 2010 and 2025. Studies addressed the ethical implications of AI deployment in respiratory care were included, screening and data charting were performed independently by reviewers using predefined criteria. Out Of the 33 articles identified, 9 were screened, and 5 were included across respiratory conditions, Data Privacy and Confidentiality, Algorithmic bias, and Equity, Transparency and Black box pattern, Accountability, Patient autonomy and Surveillance. These ethical challenges were consistent, indicating systemic governance gaps rather than disease-specific ethical concerns. This review concluded that Artificial intelligence can enhance clinical decision making and is being utilized to diagnose respiratory conditions(Asthma, Pneumonia, and Occupational Lung Disease).But this review addressed 5 ethical issues including Data Privacy and Confidentiality, Algorithmic bias, and Equity, Transparency and Black box pattern, Accountability, Patient autonomy and Surveillance. Thus for safe application of AI in respiratory disease management must require transparent AI systems and strong ethical guidelines.

**Keywords:** Artificial intelligence, Autonomy, Data privacy & Confidentiality, Ethical issues, Transparency.

### 1. Introduction

Artificial intelligence is rapidly transforming healthcare by enabling data analysis, predictive modeling and decision support system that assist healthcare providers in diagnosis and treatment planning. AI refers to computational system capable of replicating human cognitive functions such as learning, reasoning, through algorithms and data

driven techniques(Baldassare et.al.,2013)The goal of machine learning and deep learning are is to provide classification phrases that are easy for humans to understand. They must adequately resemble human reasoning in order to shed light on the decision-making process (Taiwoet.al.,2024) With the increasing availability of electronic health records,



medical imaging data, wearable sensor data, and genomics databases, healthcare systems today generate massive volumes of data that exceed Healthcare providers' capacity to evaluate manually. As a result, AI technologies are now crucial tools for handling large datasets and deriving clinically significant insights that aid medical decision-making. Medical diagnostics are now more accurate and efficient due to recent advances in machine learning (ML). These technologies are particularly useful in areas such as individualized treatment planning, disease prediction, and medical imaging. In some diagnostic tasks, deep learning algorithms which employ multi-layered neural networks to find patterns in complex datasets have been shown to perform on par with, or even better than, human experts (Matsuzaki et al., 2018). Therefore integrating AI into healthcare has significant potential to improve patient outcomes, reduce medical errors, and enhance diagnostic precision. Respiratory illnesses are one of the main causes of morbidity and death worldwide and constitute a significant burden on global health. Asthma, pneumonia, and occupational lung disorders are examples of conditions that substantially impair quality of life and provoke high medical and financial costs (Yi R Tang et al., 2023). One of the main features of asthma is airway hyperresponsiveness (AHR), which is frequently measured using direct airway challenge tests, such as the methacholine challenge test, which helps assess airway responsiveness in patients with asthma-like symptoms (Mekov E et al., 2025). Asthma impacts an estimated 339 million individuals globally, encompassing both adult and pediatric populations. Consequently, by focusing on the distinct requirements of each patient, as opposed to employing a generalized disease management strategy, personalized treatment plans offer the potential to improve patient outcomes (Tan LD et al., 2025). Pneumonia is an infectious disease that inflames the alveoli in the lungs and can be fatal if left untreated. The illness frequently presents with cough, fever, shortness of breath, chest pain, and exhaustion, and may be caused by viruses, bacteria, fungi, or other pathogens. With around 0.9 million deaths reported in 2017 alone, pneumonia remains a

major cause of death worldwide, especially among Adults and Pediatrics, Chest X-ray, blood cultures, sputum analysis, bronchoscopy, and pulse oximetry are among the conventional diagnostic techniques used in the evaluation of pneumonia. Because of its accessibility and ability to demonstrate lung pathology, Chest X ray, the most widely used diagnostic technique among these. However, many healthcare systems, especially those in low and middle-income nations, struggle with a shortage of qualified experts, and the accurate interpretation of chest X-ray requires skilled radiology expertise. Approximately two thirds of the world's population is thought to lack sufficient access to radiology expertise, which can cause delays in diagnosis and treatment (Yi R, Tang et al., 2023). AI technologies are now being used in occupational health settings to monitor work conditions, forecast health hazards, and enhance worker safety with wearable sensors and smart protective gear. These technologies offer prospects for better workplace safety and early diagnosis of occupational lung diseases, but they also raise ethical questions about data monitoring, worker privacy, and the appropriate use of surveillance tools. To achieve accountable and open utilization, powerful moral structures and laws should inform the design and execution of AI in healthcare and work medicine. Large datasets are crucial for training AI models, and biases or errors in these datasets could lead to inaccurate predictions or inequitable healthcare outcomes. Additionally if AI generated outputs are not properly assessed by healthcare providers, they may occasionally produce false or misleading information a phenomenon frequently referred to as hallucination which could jeopardize patient safety (Baldassarre et al., 2013).

## 2. Method

A scoping review was chosen because the objective was to broadly map ethical concerns in respiratory disease management. The research question was: What ethical concerns have been raised about the use of AI in the diagnosis [1], tracking, and treatment of respiratory conditions such as asthma, pneumonia, and occupational lung diseases? In accordance with the Joanna Briggs Institute (JBI) and PRISMA- Scr guidelines. The five stages followed were: (1) identifying the research question, (2) identifying relevant studies, (3) selecting

eligible studies, (4) charting the data, and (5) collating, summarizing, and reporting the results (Arksey & O'Malley, 2005)

- **Eligibility Criteria:** Studies were eligible if they included patients diagnosed with respiratory diseases such as asthma, pneumonia, and occupational lung diseases, Adult or pediatric populations receiving respiratory healthcare, This review included studies addressing Artificial Intelligence applications in respiratory disease management, Studies focusing on patient populations using AI-based tools for diagnosis, management also this review will consider studies conducted in Healthcare settings, including: Hospitals, Respiratory clinics, remote monitoring systems. We excluded studies that are not related to artificial intelligence applications in respiratory disease management; Studies focusing solely on non-respiratory diseases or other medical[2] specialties without relevance to respiratory care; conference abstracts without full text, and opinion pieces lacking substantial methodological content; Duplicate studies retrieved from multiple databases; Studies where the full text is not accessible were not included in this scoping review[3].
- **Search Strategy:** We developed comprehensive search strategies to retrieve relevant articles from Pub-med, Scopus, and Web of Science. Searches applied a combination of MeSH terms and keywords related to Algorithmic bias and equity, Artificial intelligence, Autonomy, Data privacy & confidentiality, Ethical issues, Respiratory diseases, Transparency. Boolean operators AND and OR were used to connect terms and refine results. All the terms were available across all searchable fields to identify ethical concerns in Respiratory Disease management [4]

**Table 1 Proposed search strategy in Pub-med, Web of Science, Scopus**

S. No	Databases	Search terms*	RESULTS
1	Pubmed	(["Artificial Intelligence"[Mesh Terms] OR "machine	23

		learning"[Mesh Terms]AND ("Respiratory Tract Diseases"[Mesh Terms] AND ("Ethics"[Mesh Terms]))	
2	Web of science	((["Artificial Intelligence" OR "deep learning") AND ("Respiratory disease" OR Asthma OR pneumonia OR occupational lung disease) AND (ethics OR "data privacy" OR accountability))	05
3	Scopus	((["Artificial intelligence" OR "deep learning") AND ("respiratory disease" OR asthma OR COPD OR pneumonia) AND (ethics OR ethical OR "data privacy" OR Bias OR transparency))	05

- **Search Strategy:** To find duplication, Rayyan AI imported every article found in databases. Reviewers checked abstracts and titles against the qualifying requirements after eliminating duplicates. Potentially pertinent articles' full texts were obtained and carefully evaluated. During the text screening phase, reasons for exclusion included an incorrect study design. Any disagreements between reviewers at any stage were resolved through discussion or by involving a third reviewer. The study selection process is presented in a PRISMA-Scr flowdiagram[5]

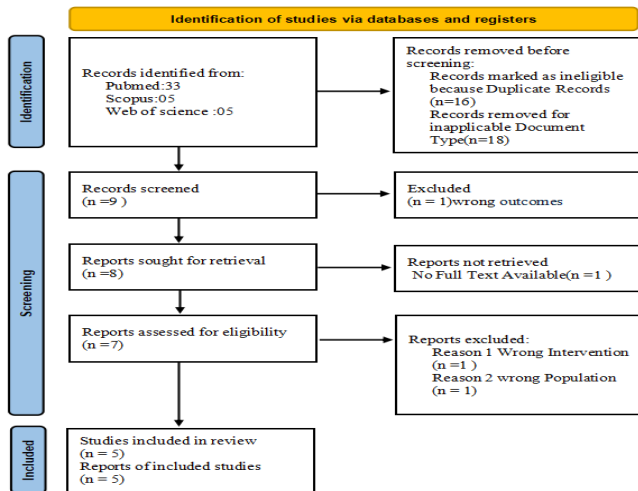


Figure 1 PRISMA-Scr flowdiagram

### 2.1.Data Extraction

The extracted data included key information about each study, such as author, year of publication, country of study, study design, population characteristics, type of artificial intelligence technology used, respiratory disease focus (e.g., Asthma, Pneumonia, and Occupational Lung Disease), ethical issues identified, and key findings related to AI implementation[6].

SL NO	Author/year /country	Objectives	Particip ants characteristics	Study design	Data collection method type	Results	
						Artificial intelligence technologies used	Findings related to AI implementation
1	Smith et al., 2022 / USA	To evaluate AI diagnostic performance and ethical concerns in pneumonia imaging	Patients with pneumonia	Cross sectional	Hospital radiology imaging analysis	Data privacy concerns; algorithm bias	Improved diagnostic accuracy using deep learning
2	Kumar et al., 2023 / India	To assess AI prediction in asthma exacerbations and related ethical concerns	Adults with asthma	Observational	Clinical predictive model analysis in OPD	Lack of transparency and explainability	AI predicted asthma exacerbations
3	Tan et al., 2025 / Singapore	To evaluate predictive analytics for asthma attack prediction	Asthma patients	Cohort study	Respiratory clinic predictive analytics system	Data privacy concerns; trust issues	Early prediction of asthma attacks
4	Baldassarre et al., 2024 / Italy	To review AI monitoring technologies for occupational lung disease	Workers in industrial settings	Review study	AI monitoring sensors in occupational health	Worker surveillance; privacy concerns	Improved workplace health monitoring
5	Stephen et al., 2019 / USA	To assess deep learning imaging for pneumonia diagnosis	Patients with pneumonia	Experimental study	Hospital diagnostic imaging system	Algorithm bias; transparency	Improved diagnostic but limited explainability

Figure 2 Data Extraction

### 2.2.Synthesis of Evidence

The extracted data was synthesized using descriptive and thematic analysis, consistent with the JBI methodology for scoping reviews. Initially, the included studies was summarized using descriptive statistics to present key characteristics such as study design, country of origin, types of artificial intelligence technologies used, and respiratory diseases addressed. Following this, a thematic synthesis approach were used to identify and categorize ethical issues associated with artificial intelligence in respiratory disease management. Ethical themes were identified by systematically reviewing the extracted data and grouping similar issues[7]

## 3. Results And Discussion

### 3.1.Results

Study Selection The literature search was conducted across three electronic databases: Pub-med, Scopus, and Web of Science. A total of 33 records were initially identified from the databases, including 23 records from Pub-med, 5 from Scopus, and 5 from Web of Science. During the initial screening phase, 24 records were eliminated before screening, including 16 duplicate records and 8 records excluded due to inapplicable document types. After removing these records, 9 studies remained for title and abstract screening. Following the screening process, 1 study was excluded due to an wrong outcome, leaving 8 reports. Among these, 1 report could not be retrieved due to the absence of full-text availability. A total of 7 full-text articles were assessed for eligibility. During the eligibility assessment, 2 reports were excluded, including 1 study due to the wrong intervention and 1 study due to an wrong population. Finally, 5 studies met the inclusion criteria and were included in the scoping review[8].

### 3.2. Theme

The ethical issues associated with the use of artificial intelligence in respiratory care is this reviews main focus. This includes the conflict between the systemic ethical issues that result from using AI to manage diseases like Asthma, pneumonia, and occupational lung disease, and the diagnostic advantages of AI, such as better diagnostic accuracy and individualized

therapy.

### 3.3.Sub Theme

This review identified 5 sub themes that categorize ethical issues with use of AI into

- Data privacy and confidentiality: concern : AI System require larger volume of patient data at his raise concern about protection of sensitive data .Risks :Data breaches and cyber security threats
- Algorithmic Bias and equity: concern : AI models trained on non-representative or inadequate datasets may provide biased predictions that effect different patient groups unequally.Risks:Inaccurate diagnosis for specific groups, Discrimination in healthcare outcomes
- Transparency and black box problem :concern : Many AI models operate as black-box systems, where Healthcare providers cannot clearly grasp algorithmic derives its suggestions.Risks :Lack of trust among healthcare professionals
- Accountability concern: The incorporation of AI into healthcare raises problems regarding who is liable for errors or wrong clinical judgments affected by AI systems Risks: Conflicts between AI recommendations and clinician judgment
- Autonomy and surveillance: concern : Artificial intelligence used as a tool in occupational health monitoring (wearable), sensors, workplace surveillance devices can negatively affect worker autonomy and privacy. Risks: Monitoring and surveillance at work without proper consent

### 3.4.Collation

According to five of the included research, it has been determined that ethical issues are present. Additional respiratory therapy with AI assistance is not specific but general. Notable information of the synthesis includes:

- 1) AI technologies are used to treat respiratory illness because they enhance the monitoring of patients, prediction and diagnostic accuracy. Various breathing diseases, such as asthma, pneumonia, and occupational can cause ethical problems, lung disease.
- 3)The most commonly mentioned issues are ethical: Data Privacy and Confidentiality, Algorithmic bias, and Equity, Transparency and Black box pattern, Accountability, Patient autonomy and Surveillance.

- 4)According to these studies, strong ethical governance structures are required that comprises open AI systems, effective data protection regulations, data oversight well-established accountability, clinicians.
- 5)Responsible AI implementation requires to uphold patient rights finding the middle ground between the benefits of technology and safety measures.

### 3.5.Characteristics of Included Studies

The five articles reviewed examined the application of AI in the management of respiratory. disorders, and majorly Asthma, Pneumonia, and Occupational Lung. Disease. The study reported the use of some AI technologies, including. Machine learning algorithms and diagnostic methods using artificial. intelligence These technologies had been used in various healthcare facilities, such as hospital radiology units, clinical respiratory care units, and work. health monitoring systems, The most widely reported ethical issues were: Data Privacy and Confidentiality: The AI systems strongly depend on big data like. patient monitoring data, imaging data and electronic health records. This raises issues of data security, confidentiality and unauthorized entry to. confidential patient data. Algorithmic Bias: There are studies that pointed to the possible risk of algorithmic bias, where AI systems that have been trained on small or non-representative data can generate improper predictions or disparate healthcare results among the various patient groups. Transparency and Explainability: Most AI systems act as black box systems. that, it becomes hard to know how the algorithm makes certain predictions or recommendations by the healthcare professionals. This unacceptability can clinician distrust in AI-assisted choices. Accountability and Clinical Responsibility: This is also another issue that was raised in the. literature is associated with the party making clinical decisions under the influence of AI systems. The use of AI in healthcare creates doubts about the liability and professional accountability. Workplace and Occupational Implications: The research on occupational health. also pointed out ethical issues of monitoring employees, their freedom, and the effect of AI surveillance systems on



employee privacy and workforce relationships.

#### 4. Discussion

The purpose of this review was to identify the ethical concerns related to the application of artificial intelligence in the treatment of respiratory diseases, including Asthma, Pneumonia and occupational lung disease. The results show that although Artificial intelligence technologies have a lot of potential to enhance personalized therapy, predictive modeling, and diagnostic accuracy, they also bring up significant ethical issues that need to be resolved for responsible application. The review's conclusions are in line with earlier research that emphasizes Artificial intelligence trans-formative potential in respiratory care. The potential of automated systems to support physicians in early diagnosis and enhance clinical decision-making is demonstrated by the excellent accuracy with which Artificial intelligence based machine learning models have identified pneumonia from chest X-rays (Stephen et al., 2019). These results are consistent with the current scoping review, which found that one of the most common applications of Artificial intelligence in respiratory healthcare is diagnostic imaging. But despite these promising results, algorithmic bias and the requirement for clinical validation before broad implementation continue to increase ethical questions. Analyzing patient data from wearable devices, environmental monitoring systems, and electronic health records, machine learning algorithms can be used to predict asthma exacerbations and individualized treatment plans according to research on Artificial intelligence in the management of asthma (Tan et al., 2025). These technologies have the potential to improve patient adherence to medication, improve symptoms monitoring and provide early signs of exacerbations. Important ethical issues patient autonomy, equitable access which were also identified in present scoping review. Strong data protection measures are important to preventing privacy violations and cyber-security issues since Artificial intelligence systems often process massive amounts of sensitive patient data, including clinical and genetic data. The review's conclusions also support more general debates on moral Artificial intelligence governance in healthcare. Research has shown that in order to

guarantee safe and equitable healthcare outcomes, Artificial intelligence systems should be transparent, accountable and fair (Yi R, Tang et al., 2023). The review's included studies raised similar issues, especially with relation to algorithms' lack of openness. Healthcare professionals find it challenging to understand how forecasts or recommendations are produced because many Artificial intelligence systems function as intricate "black-box" models. Healthcare professionals can be reluctant to use these technologies in clinical practice if Artificial intelligence outputs are not clearly explained. The integration of generative Artificial intelligence and large language models in occupational medicine may alter workplace structures and have an impact on worker safety, privacy, and autonomous algorithmic management, making the ethical implications of Artificial intelligence even more complicated in the context of occupational health (Baldassarre et al., 2024). Algorithmic bias is another important ethical issue that has been found in both the examined studies and the body of existing literature. Healthcare inequities may be reinforced or predictions made by AI models trained on small or non-representative data sets may be erroneous. Skewed datasets can lead to unfair outcomes for certain populations of patients, especially those having limited access to digital technology according to (Tan et al., 2025). Therefore, having representative and diverse training datasets is important to improving the reliability and fairness of Artificial intelligence based healthcare systems. Additionally, research shows how important it is to maintain human oversight in Artificial intelligence aided clinical decision making (Baldassarre et al., 2024). observed, especially when taught on ambiguous or inadequate data, generative Artificial intelligence systems may sometimes produce inaccurate or deceptive outputs. Therefore, instead of relying solely on automated systems to make medical judgments, healthcare providers need to rigorously evaluate Artificial intelligence made recommendations. Comprehensively, the findings of this scoping review support the previous studies that suggest that Artificial intelligence technologies may be of significant help in the field of managing. better



diagnostics, machine learning, and respiratory diseases. individualized healthcare. To empower responsible and equal Artificial intelligence. But, ethical issues like privacy of data and confidentiality, algorithmic, etc. bias, equity, transparency and black box patterns, accountability, patient autonomy, and surveillance should be touched upon. These findings underline the importance of developing comprehensive ethical requirements, law and regulations to guide the secure integration Artificial intelligence of respiratory healthcare. The World Health Organization. When applying Artificial intelligence in healthcare systems, the World Health Organization The postulation of stringent ethical governance has also been brought out by organization. focusing on the areas of responsibility, transparency, and data protection (Baldassarre et al., 2024).

### Conclusion

This scoping review demonstrated that the increased use of Artificial intelligence technologies in the management of respiratory diseases aids in the diagnosis and prediction of respiratory diseases, and could help improve healthcare outcomes and clinical decision making, but ethical concerns are to be carefully considered in this case. To allow safe and accountable application to Artificial intelligence to respiratory healthcare it is necessary to devise transparent Artificial intelligence system, data protection guidelines, clear ethical principles.

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